Siachen Glacier

World’s highest battlefield

Today, Indian youth identify Siachen with roaring helicopters, loud bursts of mortar, gunfire, and brave Indian soldiers in camouflage patrolling against the backdrop of stark and picturesque Himalayan peaks. The persistent snows of the Siachen glacier have, in a sense, nurtured the ancient Indian civilization, for, through millennia it has been the reservoir that has fed the Indus river. It seems though as if it can quench our thirst only for so long…

Location and Geology

The Siachen Glacier is located in the eastern Karakoram range of the Himalayas just northeast of where the Line of Control between India and Pakistan ends in Ladakh. It stretches to about 76 Km ranking it the longest glacier in the Karakoram and the second-longest in the non-polar areas worldwide.

The Siachen Glacier is aligned from northwest to southeast. It originates at the root of the Indira Col West, a low point on the Indira Ridge, at an altitude of 6,115 meters (20,062 feet), and it paves down to an altitude of 3,570 meters (11,713 feet). It is delivered by several tributary glaciers. On its left are three tributary glaciers: North Terong, South Terong, and Teram Shehr. On its right are five tributary glaciers: Gyongla, Lolofond, Zingrulma, and two unnamed tributaries. At the glacier’s mouth, two proglacial meltwater streams form, and eventually combine into a single stream, thus forming the Nubra River in Ladakh.

Being Siachen is a temperate-zone glacier, it produces a

heavy deal of runoff during ablation season, causing the Nubra river to carry a mass load of sediment. The Nubra flows for 90 km before its conjugation with the Shyok River, which finally drains into the 3,200 km long Indus River. The Siachen Glacier and adjoining regions gain most of their precipitation from low-pressure systems called western disturbances. Lower elevations receive about 75 to 150 cm of snow per year, while higher elevations receive more than 1,000 cm of snow. Higher elevations remain at subzero temperatures for up to 90 % of the year. The minimum winter temperature ranges from −20 to −40 °C.

History and Strategic Importance

In October 1848 the first-ever known report on the Siachen was written by British mountaineer-explorer Henry Strachey. In 1909 British mountaineer-explorers Arthur Neve, Tom Longstaff, and A.M. Slingsby tried to specify the exact location and length of mountain passes in the region. Longstaff named the glacier, which comes from the native Balti language—Sia refers to a species of wild rose that grows in the vicinity of the glacier and Chen refers to anything found in abundance Thus the name Siachen refers to land with an abundance of wild roses.

The Siachen glacier has strategic significance as it separates central Asia from the Indian subcontinent, and demarcates Pakistan from China in the region. The Saltoro Ridge of the Siachin glacier serves as a division between PoK and China, hence inhibiting them from developing any geographical military linkages in the area. It also serves as a watchtower for India to keep a watch on the Gilgit and Baltistan regions of Pakistan. Had the neighbors gotten the location advantage in Siachen, it would be a big red sign for India at Ladakh

from the west and Aksai Chin in the east. Due to its control over Saltoro Ride, India is better positioned to strike a bargain while settling bilateral territorial disputes with its neighbors in the future. Siachen also helps India to monitor China's activities as Beijing has greatly improved its infrastructure in the region. China has built all-weather rail and road links in the Shaksgam region, which was ceded to China in the 1960s by Pakistan. The Indian-controlled Karakoram Pass triangle region has played a significant role in preventing any developments in the strengthening of the Sino-Pakistan footprints on these strategic heights.

But it wasn't always under the Indian administration. Initially, it was just a lone snow-covered desert at a high altitude with no prospects. Pakistan was the first to realize the potential of this tactfully-important unoccupied area. However, until 1970 it didn't deploy troops but used to conduct confidential mountaineering expeditions to the glaciers. In early 1981, Indian Army Colonel Narinder Bull Kumar busted the news of Pakistan's expeditions in the region when he came across a U.S.-drawn map of northern Kashmir that showed the Siachen Glacier as part of Pakistan. As a result, the Indian army sat down for a discussion with the government and allowed the Colonel to map the entire region.

Sensing Indian Army's growing interest in the region, Pakistan Army had curated a mission to occupy the area but was hit by intelligence failure. It was because the London-based company that had just received bulk orders of shipping mountaineering gears to Pakistan was also a supplier for India. And so the information was leaked. India got reports about Pakistan's acquisitions. In April 1984, under the secret mission Operation Meghadoot, India hurriedly dispatched troops to Siachen. Indian troops scaled the glacier a week earlier than Pakistan. By the time the counterpart reached the region, India had officially claimed control of the glacier and the adjacent Saltoro ridge, using Col Kumar's maps. To honor his

dedication one of the key Indian installations in Siachen is named Kumar Base after him.

Life in Siachen

Siachen doesn’t solely hold military significance but is also noteworthy for its biodiversity. You might wonder what life can exist at below -20 degree centigrade and above 2600 feet as normal life is virtually impossible here.

Onions and eggs become stonelike and cannot even be broken and most toothpaste except gels cannot be squeezed out as they are frozen into solid. Chocolates become as hard as steel and if you bite them, you could break your teeth. Metal and human skin become so piercingly chilly that when a soldier tries to load his gun, the bullets adhere to his gloveless hand. If he tries to pull them off, the skin will also peel off. Even in full woolen clothing one cannot stand outside for more than ten minutes. These circumstances make the expeditions to Siachen all the more challenging and adventurous.

So when explorers visit the glacier for an ‘experience of a lifetime’ they at times encounter rare bird diversity like the hill pigeon, yellow-billed crow, red-billed crow, raven,white-winged river chat, great rosefinch, white wagtail, and accentor.

At first glance, the area surrounding the glacier front, its surface, and the streams originating from the melting glaciers might seem to be too extreme to harbor any life forms. On the flip side, there are various organisms that permanently colonize the cryosphere like bacteria, mosses, invertebrates, and vertebrates. Although glacial biodiversity is largely undocumented. The most commonly sighted animals are the snow leopards which wrap their tails around themselves in the fashion of a scarf, ibex the wild goats with horrifying horns that vanish in a few seconds to escape human scrutiny, and the

brown bears that either hibernate or exhibit mood swings.

There are surprisingly more than 20 species of alpine flora in the region.

“It implies that mother nature may be ruthless but it still nurtures.”

Environmental issues

Glacier retreats

Although Siachen has provided abundant opportunities from security to water resources it continues to meet adversity. The spent bullets strewed around a deep brown mountainside or the ugly black blots of oil and chemicals that stain the virgin snow speak of the issues regarding the glacier. Unfortunately, the Siachen glacier is at risk of disappearing from the world map, not for one but two reasons: the impact of global warming and the militarization of the glacier. Siachen is the world’s largest mountain glacier, 70 km long and 5-10 km wide and unfortunately, it is shrinking. What’s worse is, as snow is melting, the number and size of blue lakes within the glacier have increased. This suggests that man has succeeded in doing what all of nature’s fiercest forces failed to do over a million years, that is dislodge the glacier’s snow which nourishes the rivers of the Indian Subcontinent.

The research studies have reported the impact of global warming on the glacier that the mouth of it has receded backward by 800 meters in the last ten years. A survey organized by Intergovernmental Panel on Climate Change in 2015 has indicated that an increasing frequency of glacier retreats leading to avalanches is the worst consequence of global warming witnessed in the Himalayan region. Also, the Snow and Avalanche Studies Establishment of India’s defense ministry

had explained that the frequency of avalanches had been going up at an alarming rate since 1984 and that the maximum and minimum winter temperatures on the glacier had been rising upwards exponentially. Avalanches have single handedly become the deadliest enemies of the Soldiers serving in the Siachen Glacier. There are pieces of evidence that the core of the glacier is melting. While reasons pertaining to it are wide ranged from a macro level like global warming to micro-level factors that are precipitating the damage. Digging deeper we find glacier is a large bulk of permanent and mobile ice formed on land by the accumulation and crystallization of snowflakes. This is where the freshwater is stored and then discharged through rivers from time to time. The core unapologetically remains frozen.

In winter, snowfall increases the size of glaciers and recedes in summer by melting to form fresh water for the rivers. So if the glacier shrinks as evident for Siachen, it means more ice is melting than getting replaced. As a consequence snow falling on the glacier is less likely to consolidate. Increased melting of the glacier increases the flow of water into the rivers in a short time period which drains the reservoir. Once it is drained, the river will irreversibly dry up.

The effects of global warming on the Siachen glacier are further confirmed by the fact that rain which had been a rare phenomenon in the past few decades has shown presence as light drizzling frequently now. This has resulted in the greenery and plantation on even at 15,000 feet height whereas previously it was not even possible at 12,000 feet height.

Garbage dumping

More than 1,000 kg of garbage are dumped in Siachen every day by the Indian and Pakistan armies. Neither can the water in the Nubra or the Indus be considered clean or fresh.

Moreover the visible impact of global warming especially the glacier retreat is attributed to the fact that there is a hike in pollution owing to an increased deployment of the army in the region. Siachen is polluted by the remains of crashed helicopters, worn-out gun barrels, empty fuel barrels, burnt shelters, splinters from gun shelling, skid boards, telephone wires, parachute dropping boards, canisters, gunny bags, edible oil containers, rotten vegetables, bad meat, expired tinned meat, wrappers, cartons, shoes, clothing, ration items, etc. There are bodies that could not be recovered and vehicles that are declared beyond economic repair. All these have led to the formation of crevasses in the glacier

The garbage cannot decompose in the freezing atmosphere and remains there for years, which is an ugly reminder of man’s destructive capabilities. In the meantime, the polluted ice stream down the rivers causes health hazards for people living on the banks.

If the melting of the Siachen glacier persists, then the millennia-old freshwater reservoir may dry up in just another 50 years or so. It is like telling a vibrant and healthy 91-year-old man that he will die in seconds.

Imbalance in Ecosystem

Siachen is much more than the world’s highest, costliest and deadliest war zone. It is a highly fragile and sensitive ecosystem that is home to endangered species like the brown bear, and snow leopard, and the species they depend upon for food.

But even if Siachen is demilitarized, it will take many decades to revive the glacier from total disappearance because serious damage has already been done in the form of a rise in local temperature, the thinning of the glacier, deep cracks in the snow and avalanches.

Preventive Measures

Peace Park

If the glacier is exposed to frequent avalanches, it will risk the lives of thousands of military and non-military personnel who are deployed in this dangerous conflict zone. Therefore an idea known as “peace park” was proposed. It could enable the demilitarization of the glacier which would consequently pave the way for collective damage control measures to help save the glacier from further erosion.

The idea of announcing the Siachen region as a “Peace Park” was presented by environmentalists and peace activists in an effort to preserve the ecosystem of the region most harmed by the military presence. In September 2003, the participants of the 5th World Parks Congress held at Durban, urged the governments of India and Pakistan to establish a peace park in the region of Siachen to restore the natural biological system and protect species whose lives are vulnerable.

After a proposal of a transboundary Peace Park was popularised, the International Union for Conservation of Nature (IUCN) and the International Mountaineering and Climbing Federation (UIAA) organized a conference in Geneva and invited Indian and Pakistani mountaineers Harish Kapadia, Mandip Singh Soin, Nazir Sabir, and Sher Khan. The region was pushed for inclusion in the United Nations’ World Heritage List as a part of the Karakoram range but was put on hold by the World Heritage Committee.

The area to the east and west sides of the Siachen region have already been declared national parks: namely the Karakoram Wildlife Sanctuary in India and the Central Karakoram National Park in Pakistan.

Sandia National Laboratories organized seminars where

environmentalists and military experts from both India and Pakistan and also from other countries were invited to present joint papers. A researcher at the Cooperative Monitoring Center of Sandia Labs, Kent L. Biringer, suggested setting up Siachen Science Center, a high-altitude research center where scientists and researchers from both countries can carry out research activities related to glaciology, atmospheric sciences, geology, meteorology, and other related fields. However, this proposal, as evident, was met with disagreement by both the concerned nations keeping in mind the diplomatic relations that both of them share.

Waste management

Even if demilitarization were to happen, would it undo the amount of garbage already dump?

According to the 2018 Concept note on the waste management on the glacier that the Army made bringing down waste a part of the Standard Operating Procedure (SOP) for troops. Now mounds of garbage have to be taken down from Siachen to dispose of through the following procedure which turns out to be a rather costly and time taking affair.

Biodegradable waste is wound using the balling machine. Non-biodegradable and non-metallic waste is dealt with by incinerators. As the waste burns in the incinerator, there is no carbon monoxide produced and the residual ash is used as manure. Metallic wastes are taken to an extrication center where they are crushed as reused.

One possible solution to the immediate problem of garbage in Siachen, according to the director general of The Energy and Research Institute (TERI), is to utilize microbiology-based solutions to decompose it. However, it continues to be in the experimental phase.

Efforts by Army

Huge high-altitude plantations are being undertaken by the Army near the Siachen Base Camp. The Indian army looks forward to minimizing the production of waste and making the glacier garbage free in the next 12-15 years. They have considered the options like cutting down on supplies and rations so that the region is made self-sustainable and fewer utilities are taken up.

Conclusion

Most experts agree that conserving glaciers is a scientific challenge that demands urgent attention. But very few agree on a comprehensive policy for the larger geo-political initiatives that are essential to save the future of our rivers.

Siachen glacier is not singularly important for national defense but they are also freshwater reservoirs and the planet’s air conditioner. Moreover rapid melting of ice increases sea level at a fearsome rate that affects millions of people living in coastal regions.

An immersive study of the glacial ecosystems, if organized, can help us understand how lifeforms are essential in maintaining the dynamics of the glacier and how they react in glacier retreats. Glacial resources like medicinal herbs and microbes favorable for biotechnology can chronicle human life.

In the meantime, the armies continue to battle it out in Siachen with disregard to the effects it is posing.